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Conference Abstract

Peatlands in wind of change in Estonia – do paludiculture, rewetting or restoring drained peatlands turn the tables and ecological values will dominate?

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Abstract

Mire ecosystems are highly sensitive to changes in hydrology, which may be caused by changes in climate or land use and in either case disturb the delicate balance between peat accumulation and decomposition. While climate change affects peatlands at global and regional scales, drainage is the most important single factor affecting mires globally at all scales but its effects vary depending on drainage type, climate and initial wetland ecosystem. Mires are important natural ecosystems with high value for climate regulation, biodiversity conservation, flood control and human welfare (Costanza et al. 1997, Erwin 2008) but the quality of these services will decline rapidly if peatlands are drained and often economic (provisioning) values are dominating.

In this presentation we introduce drainage effect and its intensity on peatlands by many biotic and abiotic indicators, and demonstrate rewetting options according to land use and initial wetland type based on studies in Estonia, northern temperate climatic zone. Large-scale drainage of mires, especially fens and transitional bogs was executed between the 1950s and the 1980s in Estonia. The main cause of the loss of mires was drainage for forestry and agriculture dominantly in fens and transitional bogs, and peat

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industry in ombrotrophic bogs. Today peat extraction continues in limited areas (approximately 2% of all drained peatlands).

Active restoration of peatlands has been studied globally for decades (Rochefort et al. 1997, Price et al. 1998, Erwin 2008) while knowledge about effectiveness of different rewetting measures and factors affecting successful restoration, especially at regional level are still limited. Besides limitations in knowledge in spatial and temporal dynamics of physico-chemical and biological changes in restored peatlands, uncertainty is even higher about public acceptance and engagement in peatland rewetting. While simple rewetting by ditch blocking in low productivity drained peatland forests or abandoned peat extraction areas are easily accepted publicly, more expensive full-scale restoration activities like moss layer transfer technique or restoring mire ecosystem functions in more productive peatland forest or agricultural lands is often opposed if income providing paludiculture or compensation by other means is not provided.

Based on 8 years long time series from rewetted peatlands in Estonia (Fig. 1) we demonstrate that rewetting or restoration cannot bring back all values lost as a result of peatland degradation in short term, but mitigation happens quickly: significant reduction in CO2 emission (up to 40%) takes place within a year, water chemistry (total organic carbon, dissolved nitrogen) improves in 2-3 years while vegetation recovery takes longer and is heavily dependent on weather conditions after rewetting.

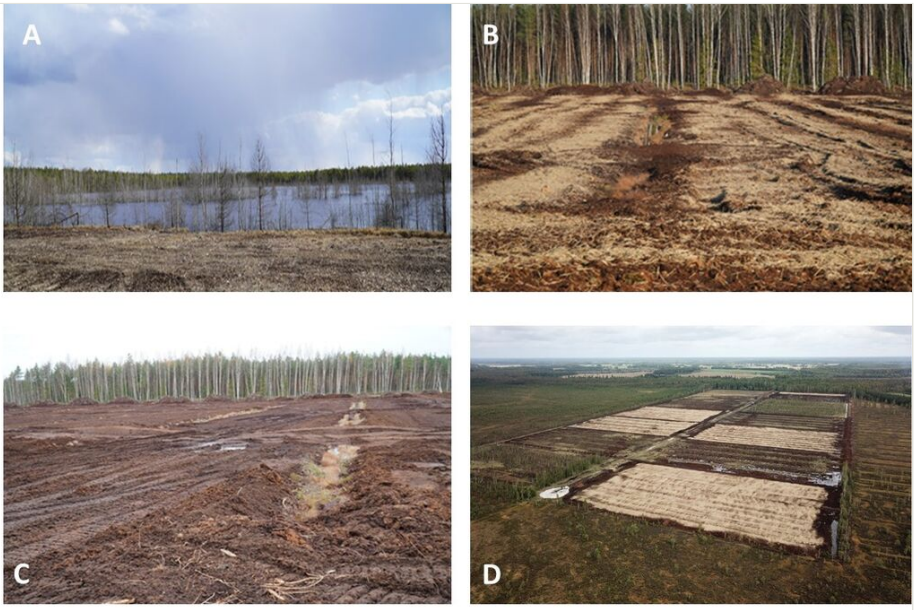

Figure 1. doi

Peatland restoration is a complex task that often requires application of multiple measures like creation of shallow water body (A), ditch blocking and use of moss layer transfer technique (B), ditch blocking (C) or filling, forest thinning (D) and implementing these in combination in restoration site at landscape level (D).

Presenting author

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Presented at

KEYNOTE

Conflicts of interest

The authors have declared that no competing interests exist.

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